ROCKY MOUNTAIN COLLEGE

Course Syllabus: MAT 175 – Calculus I

Fall Semester 2013, Section 1

Instructor: Ulrich Hoensch, Ph.D.

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- Office Hours:
  - Monday 8:00 a.m.-10:00 a.m. and 1:00 p.m.-2:00 p.m.
  - Tuesday 1:00 p.m.-2:00 p.m.
  - Wednesday 8:00 a.m.-10:00 a.m. and 1:00 p.m.-2:00 p.m.
  - Thursday 1:00 p.m.-2:00 p.m.
  - Friday 8:00 a.m.-10:00 a.m.

  and other times by appointment.

Class Information

- Credits: 5 semester hours
- Class Meetings: Monday, Tuesday, Wednesday, Thursday, Friday 7:00 a.m. - 8:00 a.m.
- Room: Morledge/Kimball 125
- Class Web Page: `www.rocky.edu/~hoenschu/FS_2013/MAT175/main.html`

Text/Calculator Weir/Hass, *Thomas' Calculus: Early Transcendentals*, Twelfth Edition, Addison-Wesley ISBN 0-321-58876-2; a graphing calculator such as the TI-83 Plus is required.

Course Description This course is a study of the functions of one real variable. The ideas of limit, continuity, and differentiation are explained and applied to physical problems. Topics include the use of approximations and problem solving. The use of graphing calculators is required. Prerequisite: satisfactory score on a placement exam or completion of MAT 110 with a grade of "C" or higher.

Rationale MAT 175 can be used to fulfill part of Rocky Mountain College's Mathematics General Education Requirement. MAT 175 is a required class for a major and a minor in mathematics and the mathematics education major, and must be completed with a grade of "C" or higher for those majors. It is a highly recommended course for students seeking true academic and intellectual excellence.

Course Objectives At the completion of MAT 175, students will be able to:

(1) Compute limits using their definition and using rules for limits.

(2) Estimate limits from the graph of a function and numerically.

(3) Find the points of discontinuity of a function when given either the formula, or the graph of the function.

(4) Compute the derivative of a function using the definition and using rules for derivatives.

(5) Model real-world situations using functions and equations, and use differentiation to solve questions involving rates of change in these situations.

(6) Approximate functions locally and use these linear approximations to predict values of the function.

(7) Maximize and minimize functions of one variable and use optimization in application problems.

(8) Use first and second derivatives to analyze functions and sketch their graphs.

Methods of Evaluation Students will be evaluated based on the following evidence.

- Tests, in-class and homework assignments.
- Attendance record, timeliness, the amount of courtesy and respect extended towards fellow students and the instructor.
- Level of academic and personal honesty and integrity.

Criteria for Grade Assignment To receive a passing grade, a student must show evidence that she/he is able to successfully perform the tasks laid out as course objectives (see above). Furthermore, students must attend all class meetings, arrive on time and exhibit appropriate classroom and social behavior. More specifically, a student is required to have accrued at least 60% of possible points to meet these criteria (see below). In addition, all submitted work must be the student's own work, or if it is not, names of sources or collaborators must be identified.

Possible points will come from:

- 3 one-hour, in-class tests, each worth 100 points; here students must submit only their own work, by using only a graphing calculator, and other explicitly permitted material.
- The final exam, which is worth 200 points; here students must submit only their own work, by using only a graphing calculator, and other explicitly permitted material.
- Several in-class assignments, or homework assignments, worth a total of 300 points.

This amounts to a total of 800 possible points. The following grading scale will be used to assign grades.

A: 90%, or more B: 80% - 89% C: 70%-79% D: 60%-69% F: less than 60% of possible points.

Instructional Methods and Experiences This is a small-class lecture with occasional in-class practice sessions. Student participation in the lecture is encouraged, group work is encouraged for

the in-class work. Study groups outside of class are strongly recommended. However, completion of homework assignments must be done independently by each student.

Class Policies Students are required to attend all class meetings and complete all assignments. Graded homework or worksheets must be submitted by the due date indicated by the instructor. Late homework or worksheets will not be corrected and will receive no credit, regardless of circumstances or personal emergencies. All in-class assignments, including tests and exams, must be completed in the time allotted by the instructor. All work on tests and exams must be the student's own work, and may only be obtained through the use of explicitly allowed tools. Homework assignments must be completed independently by each student. Tests and exams may only be made up if the instructor is notified in advance of qualified absences. Qualified absences are limited to the following: (a) activities connected with Rocky Mountain College programs; (b) grave illness (in which case a doctor's note is required); (c) a family or personal emergency, or due to force majeure. In case (a), students must inform the instructor prior to their absence. In cases (b) and (c) above, students may be excused from assignments if they notify the instructor immediately after their absence.

College Academic Policies Students must abide by all Academic Integrity Policies of the College. See `http://www.rocky.edu/academics/course-catalog/FormsPolicies.php` for details.

Tentative Schedule and Topics Covered

Date	**Remarks/Topics**
Mon Aug 26	1.1: Functions and Their Graphs (Review)
Tue Aug 27	1.2: Combining Functions; Shifting and Scaling Graphs (Review)
Wed Aug 28	1.3: Trigonometric Functions (Review)
Thu Aug 29	1.5: Exponential Functions (Review)
Fri Aug 30	1.6: Inverse Functions and Logarithms (Review)
Mon Sep 02	**Labor Day – No Classes**
Tue Sep 03	2.1: Rates of Change and Tangents to Curves
Wed Sep 04	2.1: Rates of Change and Tangents to Curves
Thu Sep 05	2.2: Limit of a Function and Limit Laws
Fri Sep 06	2.2: Limit of a Function and Limit Laws
Mon Sep 09	2.2: Limit of a Function and Limit Laws
Tue Sep 10	2.3: The Precise Definition of a Limit
Wed Sep 11	2.3: The Precise Definition of a Limit
Thu Sep 12	2.3: The Precise Definition of a Limit
Fri Sep 13	2.4: One-Sided Limits
Mon Sep 16	2.4: One-Sided Limits
Tue Sep 17	2.4: One-Sided Limits
Wed Sep 18	Review for Test 1
Thu Sep 19	**Test 1**
Fri Sep 20	2.5: Continuity
Mon Sep 23	2.5: Continuity
Tue Sep 24	2.6: Limits Involving Infinity; Assymptotes of Graphs
Wed Sep 25	2.6: Limits Involving Infinity; Assymptotes of Graphs
Thu Sep 26	2.6: Limits Involving Infinity; Assymptotes of Graphs
Fri Sep 27	3.1: Tangents and the Derivative at a Point
Mon Sep 30	3.1: Tangents and the Derivative at a Point
Tue Oct 01	3.2: The Derivative as a Function
Wed Oct 02	3.2: The Derivative as a Function
Thu Oct 03	3.3: Differentiation Rules
Fri Oct 04	3.3: Differentiation Rules
Mon Oct 07	3.3: Differentiation Rules
Tue Oct 08	3.4: The Derivative as a Rate of Change
Wed Oct 09	3.4: The Derivative as a Rate of Change
Thu Oct 10	3.5: Derivatives of Trigonometric Functions
Fri Oct 11	3.5: Derivatives of Trigonometric Functions
Mon Oct 14	Review for Test 2
Tue Oct 15	**Test 2**
Wed Oct 16	3.6 The Chain Rule
Thu-Fri Oct 17-18	**Mid-term Break**

Date	**Remarks/Topics**
Mon Oct 21	3.6: The Chain Rule
Tue Oct 22	3.6: The Chain Rule
Wed Oct 23	3.7: Implicit Differentiation
Thu Oct 24	3.7: Implicit Differentiation
Fri Oct 25	3.7: Implicit Differentiation
Mon Oct 28	3.8: Derivatives of Inverse Functions and Logarithms
Tue Oct 29	3.8: Derivatives of Inverse Functions and Logarithms
Wed Oct 30	3.9: Inverse Trigonometric Functions
Thu Oct 31	3.9: Inverse Trigonometric Functions
Fri Nov 01	3.10: Related Rates
Mon Nov 04	3.10: Related Rates
Tue Nov 05	3.10: Related Rates
Wed Nov 06	3.11: Linearization and Differentials
Thu Nov 07	3.11: Linearization and Differentials
Fri Nov 08	Review for Test 3
Mon Nov 11	**Test 3**
Tue Nov 12	4.1: Extreme Values of Functions
Wed Nov 13	4.1: Extreme Values of Functions
Thu Nov 14	4.2: The Mean Value Theorem
Fri Nov 15	4.2: The Mean Value Theorem
Mon Nov 18	4.3: Monotonic Functions and the First Derivative Test
Tue Nov 19	4.3: Monotonic Functions and the First Derivative Test
Wed Nov 20	4.4: Concavity and Curve Sketching
Thu Nov 21	4.4: Concavity and Curve Sketching
Fri Nov 22	4.4: Concavity and Curve Sketching
Mon Nov 25	4.5: Indeterminate Forms and L'Hôpital's Rule
Tue Nov 26	4.5: Indeterminate Forms and L'Hôpital's Rule
Wed Nov 27	4.6: Applied Optimization
Thu-Fri Nov 28-29	**Thanksgiving Vacation**
Mon Dec 02	4.6: Applied Optimization
Tue Dec 03	4.6: Applied Optimization
Wed Dec 04	4.7: Newton's Method
Thu Dec 05	4.7: Newton's Method
Fri Dec 06	Review for the Final Exam
Thu Dec 12 7:45 a.m.- 12:00 noon	**Final Exam in MK 125**

OPI/PEPPS Standards

Standard	Course Objective
10.58.518 Mathematics	
(1) The program requires that successful candidates:	
(a) demonstrate knowledge and understanding of and apply the process of mathematical problem solving;	(5), (7)
(b) reason, construct, and evaluate mathematical arguments and develop an appreciation for mathematical rigor and inquiry;	(8)
(d) recognize, use, and make connections between and among mathematical ideas and in contexts outside mathematics to build mathematical understanding;	(5), (7)
(e) use varied representations of mathematical ideas to support and deepen students' mathematical understanding;	(2), (3)
(f) appropriately use current and emerging technologies as essential tools for teaching and learning mathematics;	(2), (5)
(3) demonstrate content knowledge in:	
(d) calculus by demonstrating a conceptual understanding of limit, continuity, differentiation, and integration and a thorough background in the techniques and application of the calculus;	(1), (2), (3), (4), (5), (6), (7), (8)